

Naval Command,
Control and Ocean
Surveillance Center RDT&E Division

San Diego, CA
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Technical Report 1543
February 1993

**The NATO Seasparrow
New Development
Technical Manual
and System
Evaluation Trainer
(SEAT) Phase II Software
Introduction**

S. I. Sander
R. J. Smillie

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The NATO Seasparrow New Development Technical Manual and System Evaluation Trainer (SEAT) Phase II Software

Introduction

S. I. Sander
R. J. Smillie

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**NAVAL COMMAND, CONTROL AND
OCEAN SURVEILLANCE CENTER
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ADMINISTRATIVE INFORMATION

The work described was conducted under the sponsorship of the NATO SEASPARROW Project Office (NAVSEA-06P).

Released by
E. A. Koehler, Head
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Under authority of
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EXECUTIVE SUMMARY

OBJECTIVE

The objective was to evaluate Fleet acceptance of the New Development Technical Manual (NDTM) and System Evaluation and Trainer (SEAT) software. These materials represent significant improvements over presently used materials. An introduction was designed to facilitate immediate use of the improved materials. This introduction included developing media and hosting workshops for individual Fleet units. The subsequent evaluation was conducted using a questionnaire that was mailed to the Fleet approximately 2 months after the materials were provided for Fleet use. The work was conducted under the sponsorship of the NATO SEASPARROW Project Office (NAVSEA-06P).

RESULTS

People who frequently use the NDTM indicate it would reduce troubleshooting time, improve accuracy, be useful for all technicians, and be useful for shipboard training.

Over 93 percent of the Fleet personnel who were introduced to the NDTM with the media (video, booklet, and pamphlet) found the media to be similarly useful.

All of the SEAT software was evaluated as easy to use.

The use of the SEAT software was expected to result in a decrease in work time.

RECOMMENDATIONS

Obtain wide community participation in the introduction of new technology. This participation will aid in achieving broad community support for new concepts and systems. The feedback from the participants will serve to help ensure that the attributes of the product are maximized.

Use a proactive orientation for the introduction of new technology. This orientation should provide for planning to allow for anticipated contingencies and must include open communication with developer and user participants throughout the introduction process.

A survey process should be considered for evaluating future evaluation projects as it provides both the development and user communities with an avenue for sharing information, identifying problem issues and concerns, and for their resolution in a timely manner.

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INTRODUCTION

The NATO SEASPARROW Project Office is sponsoring a development effort to improve technical materials. The objective is to provide the Fleet with materials that facilitate increased work efficiency. Specifically, the Ordnance Publications (OP) are being replaced by the New Development Technical Manual (NDTM) and improvements are being made to the System Evaluation and Trainer (SEAT, software).

Technical materials are sometimes developed with little or no interaction with the intended user. The materials are occasionally mailed to the Fleet without introduction, leaving the orientation and installation of the materials as tasks that the operators must perform. This routine has often resulted in the suboptimal or nonuse of materials. Such experiences provided the impetus to the current effort, intended to facilitate the integration of the new NATO materials into the Fleet.

Media were developed and an introduction team was assembled and used to introduce the NDTM and SEAT software to the Fleet. The results of the introduction effort and the Fleet response to this process and to the enhanced NATO SEASPARROW technical materials are provided.

BACKGROUND

The theme for the development and introduction of the NDTM and SEAT Phase II software was to provide user friendly materials for the technician. User participation was promoted through orientations to these materials prior to final delivery to the Fleet (Mecherikoff and Mackie, 1970). These orientations were intended to minimize any uncertainty about the new materials. This was an educational approach to the introduction of change, in contrast to a power approach whereby the user is simply informed that there is to be a change in their technical materials which would be mailed in the near future (Albrecht and

Ropp, 1984; Zaltman and Duncan, 1977).

For the NDTM, the educational introduction approach included the development of standardized media, made available to the Fleet for learning about the NATO materials. These media were developed to facilitate NATO SEASPARROW technicians in quickly becoming familiar with NDTM. Included were a video, introduction booklet, and question and answer pamphlet. The purpose of these media was to demonstrate to the Fleet that it could readily transfer from the use of the OP to the NDTM. The challenge of the task was to transfer the information to the intended users. The objective was to maintain positive perceptions for the user, as user perceptions are critical in the acceptance of innovations (Wylie and Mackie, 1982). We felt it important to show the changes were congruent with the Fleets' perspective on needed changes. Without these media, users could generate a host of misinformation regarding the NDTM.

The NDTM was introduced to the Fleet through the Naval Sea Center Pacific and Atlantic (NAVSEACENPAC and NAVSEACENLANT) Commands. These Commands provide the Fleet with technical assistance in the maintenance of the equipment.

Prior to introduction and delivery of the NDTM, a concerted effort was made to transfer knowledge about the NDTM through user participation. Included were usability testing and a review by the Fleet of a sample of the NDTM. For the usability testing, students and instructors at a NATO SEASPARROW school used the NDTM for troubleshooting. Results show NDTM was a viable alternative to the OP used for the maintenance of the NATO SEASPARROW. For the Fleet review, all NATO ships received portions of the NDTM with the task of providing comments and questions. This information was used to develop the question and answer pamphlet as well as inform the introduction team on what issues they should be prepared to focus on when they introduced the NDTM to the Fleet.

These introduction activities provided iterative learning experiences for those involved in the development and use of the NDTM (Argyris and Schon, 1972). A most important aspect was that

people at the development level received feedback from users (Kotter and Schlesinger, 1979; Mecherikoff and Mackie, 1970). The introduction of new technology can lead to or be accompanied by an increase in the level of ambiguity about the new technology. If there is no concomitant information about the new technology, people may create their own information. They may infer attributes about the change, consider how the change could impact their work, and arbitrarily assess the utility of the change. It is conceivable that change is impeded by the intended user, who is provided little or incorrect information about a change. And different people can arise as perceived salient sources of information about the new technology. A variety of issues can surface; for example, people feeling a loss of control over their work environment.

In summary, the introduction of the NDTM met the criteria for minimizing resistance to change (Bennis, Benne, and Chin, 1969). Knowledge about the new material was disseminated to the Fleet; a source with whom the Fleet had trust was the introducer of the change to the new material; and the Fleet was provided opportunities in directing the development of the NDTM. A model depicting the introduction and an explanation of the materials used for the introduction are in appendix A.

An objective of the SEAT Phase II software development was to deliver to the Fleet user friendly software. User friendly is a guideline. The objective is to provide an operator software that minimizes, if not totally eliminates, any impediments to use. The SEAT Phase II software was developed and facilitated by periodic Engineering Working Group meetings and usability testing. At the meetings, user friendly guidelines were instituted as well as human factors guidance from MIL-STD-1472D, and Smith and Mosier (1986). A sample of the software was submitted to usability testing at a school where the NATO SEASPARROW technicians are trained on the SEAT.

The NDTM and SEAT Phase II questionnaire marks the last element in the sequence of planned activities for the

introduction of the NDTM and SEAT Phase II software. The questionnaire's purpose was to provide an opportunity for the Fleet to evaluate the NDTM and SEAT software after they had used these materials for at least 2 months. The report provides the results from this questionnaire.

METHODOLOGY

SAMPLE

A total of 335 questionnaires were distributed to the 54 ships with NATO SEASPARROW technicians. Included were 148 for the Pacific Fleet and 187 for the Atlantic Fleet. Two sources were used in establishing the number of questionnaires that were distributed to the ships. One source was from information collected when the NAVSEACENS introduced the NDTM to the ships. At that time, a variety of questions were asked. One being the number of technicians assigned to the NATO SEASPARROW workcenter. The Defense Manpower Data Center was the other source of information used in determining the number of questionnaires to send to each ship. This Center provided a printout of the number of NATO SEASPARROW personnel aboard each NATO ship. For example, there are typically four or five technicians assigned to a DD type ship. Table 1 shows how the questionnaires were distributed. Questionnaires were also sent to the participating governments in the NATO consortium.

Table 1. Distribution of the NDTM/SEAT questionnaire.

Ship Type	Pacific		Atlantic	
	Number of Ships	Number of Questionnaires	Number of Ships	Number of Questionnaires
DD	13	62	16	66
CV/N	6	64	8	98
AOE/AOR	5	22	5	19
LHD			1	4

QUESTIONNAIRE

The questionnaire used for this research is in appendix B. The questionnaire contains items on participant background, the utility of the NDTM and SEAT software, and the introduction media. All of the items were developed specifically for this questionnaire.

The questionnaire was pretested with NATO SEASPARROW technicians aboard one DD ship. No changes were made to the questionnaire from the pretest.

PROCEDURE

The NDTM and SEAT Phase II questionnaire was distributed to the Fleet in the fourth quarter of FY 90. Each package of questionnaires included a cover letter from the NATO SEASPARROW project office eliciting and encouraging participation. Also enclosed was a return envelope. Participants were requested to complete and return the questionnaire within 10 days of receipt.

The purpose in sending questionnaires to all ships and all technicians was to obtain as large a response as possible. Also, we felt it is important to have a representative, stratified response. That is, one reflecting the composition of the Fleet: different types of ships, different pay grades, and different locations. Typically only a small proportion of questionnaires that are distributed are ever returned. In the case of the Fleet, with unique ship schedules and other tasking, information on ships' status is tenuous, such that a set time can be established when technicians will be available to work on completing a questionnaire. So, sending out many questionnaires was done to ensure that stratification would be achieved.

RESULTS

Eighty-seven questionnaires were received from the US Navy and three from the NATO participating governments. Figure 1 shows the 87 questionnaires are from 22 ships of which 61 percent are DDs. The majority of respondents are third class Fire Control personnel, FC3 (55 percent) and the majority of ships (67 percent) are from the Pacific Fleet.

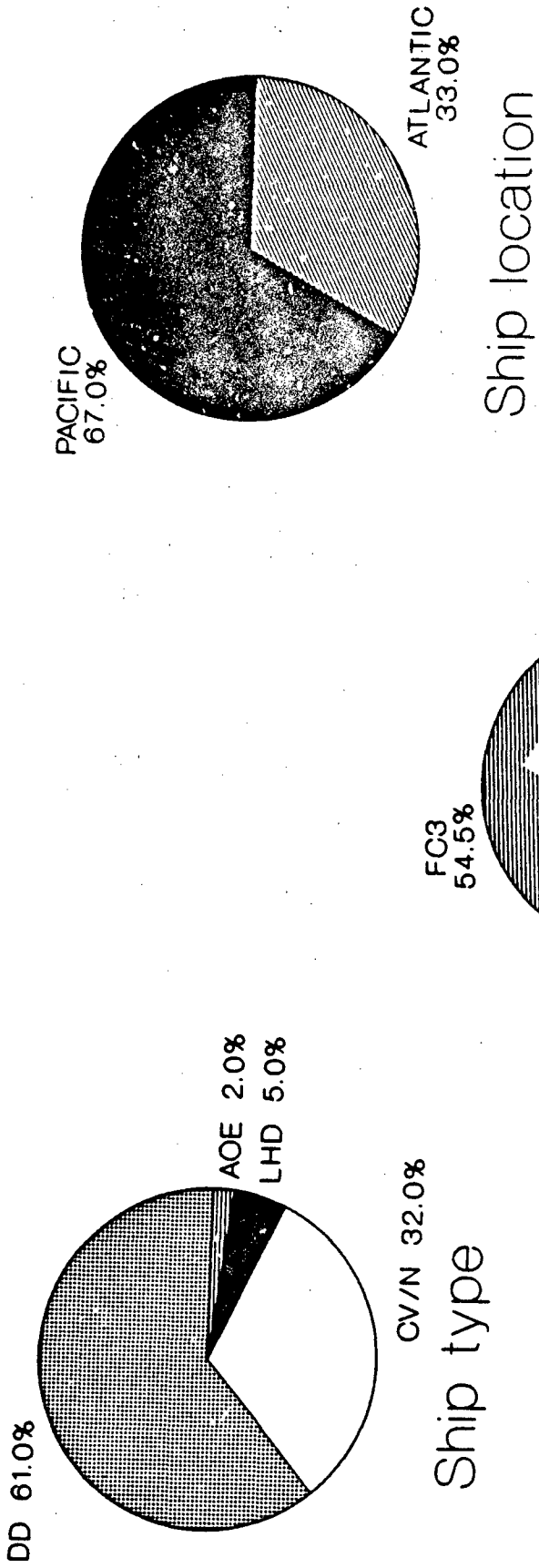


Figure 1. Participant background.

NDTM INTRODUCTION

The majority of the respondents were introduced to the NDTM by a Naval Sea Center (NAVSEACEN) representative (64 percent). Most of the other respondents learned about the NDTM from the workcenter supervisor (15 percent). These results reflected conditions in both the Pacific and Atlantic Fleets.

The materials used for the introduction were a video, introduction booklet, and question and answer pamphlet. The video was seen by 72 percent of the participants; the introduction booklet and question and answer pamphlet were read by 72 and 63 percent, respectively. These media were well received. Over 93 percent of those who were introduced to the NDTM with these media found them somewhat or very useful.

The percentage of technicians who did not have access to or use these materials was video, 28 percent; booklet: 28 percent; and pamphlet, 37 percent. Table 2 shows differences for these introduction media were found between location (Pacific and Atlantic) and ship type [DD and CV(N)]. For example, there were fewer participants in the Pacific Fleet compared to those in the Atlantic Fleet, who stated they did not view the video.

Table 2. People indicating they did not use the NDTM introduction media.

	<u>Video</u> %	<u>Booklet</u> %	<u>Pamphlet</u> %
Pacific	21	28	40
Atlantic	41	28	31
DD	19	27	33
CV(N)	36	29	43

NDTM FEATURES

The NDTM consists of three binders: System Functional Overview; Transmit Major Function; and Ship Replaceable Assembly (SRA). The Overview supports training, theory of operation, and introduction to troubleshooting. The Transmit Major Function supports fault detection, fault isolation, and repair to the shipboard replaceable assembly level. The SRA provides component drawings and part numbers. Table 3 shows all of the binders were favorably evaluated. The Ship Replaceable Assembly binder received the highest evaluation on the usefulness criteria. Ninety-one percent of the people who used this binder reported that the features in the binder were useful.

Table 3. Evaluation of NDTM features. (The percentage shown is the average for all features in a binder.)

Feature	Importance (%) ^a	Accuracy (%) ^b	Usefulness (%) ^c
System Functional Overview (MMO-011)	80	85	83
System Functional Overview (MMO-012)	78	87	80
Transmit Major Function (MMO-050)	87	90	87
Ship Replaceable Assembly (MMO-110)	92	89	91

a Important or very important.

b Mostly or completely accurate.

c Useful or very useful.

Table 4 shows the evaluation of the specific features within each of the NDTM binders. The numbers shown in the table indicate the percentage of people evaluating the features as important, accurate, and useful. All of the features in these binders were well received. With few exceptions, the features were evaluated high on these criteria by most people.

Table 4. Evaluation of NDTM features.

System Functional Overview	MMO-011	Importance (a)	Accuracy (b)	Usefulness (c)
Numbering System		72(d)	83	77
System Functional Overview (SFO) Level 1		77	84	88
System Functional Overview (SFO) Level 2		80	87	83
System Functional Overview (SFO) Level 3		83	85	82
Operational Flow Diagram (OFD) and Operational Sequence Diagram (OSD)		86	87	85

System Functional Overview	MMO-012	Importance	Accuracy	Usefulness
System Level Fault Resolution Matrices		79	86	81
System Performance Monitor Fault Index		82	89	82
System Level Indication Fault Directory		80	85	80
Daily System Operability Test (DSOT) and Radar Operability Test (ROT) Sequence Diagrams		70	88	76

Transmit Major Function	MMO-050	Importance	Accuracy	Usefulness
Transmitter Indicator Diagram		88	92	86
Degraded Faults and No Go Faults Tables		86	91	89
Subfunction Troubleshooting Flow Charts		87	93	90
Subfunction Signal Flow Diagrams (SSFD)		84	90	86
Detailed Functional Diagrams (DFD)		93	86	90
Additional Aids		84	87	83

Ship Replaceable Assembly	MMO-110	Importance	Accuracy	Usefulness
Reference Designation-to-Part Number Index		96	92	95
Illustrated Parts Diagrams		92	88	92
Part Number-to-Reference Designation Index		87	88	87

- (a) Important or very important
- (b) mostly or completely accurate
- (c) useful or very useful
- (d) %: The percentage of participants

MANUAL PREFERENCE AND PERCEIVED BENEFITS OF THE NDTM

The NDTM was preferred by 72 percent of the participants. A comparison of the NDTM evaluation criteria was made between those who showed a preference for the NDTM (72 percent) and those who showed a preference for the OP (28 percent). The evaluation criteria are troubleshooting time (TS Time), increased accuracy (Accuracy), which technicians the NDTM benefits (All Techs), and usefulness for shipboard training (Training). Figure 2 shows the results of this comparison. Large differences in the evaluation of NDTM are shown between the two groups. For example, 70 percent of the participants who preferred the NDTM indicate that use of the NDTM would result in a decreased troubleshooting time. This response is in contrast to those who prefer the OP, where only 39 percent indicate that use of the NDTM would result in a decreased troubleshooting time. As another example, 95 percent of the participants who preferred the NDTM, indicate the NDTM would be useful and benefit all technicians (new and experienced). This response is in contrast to those who prefer the OP, where 50 percent of the participants indicate the NDTM would benefit all technicians.

FREQUENCY OF USE OF THE NDTM AND PERCEIVED BENEFITS

The perceived benefits of NDTM are moderated by preference for a manual (NDTM or OP). The perceived benefits are also moderated by frequency of reference to the NDTM. We requested participants to indicate how often they had used the NDTM before they received the questionnaire. The majority of participants indicated they had used the Functional Overview (MM0-11: 62 percent; MM0-12: 65 percent) and Ship Replaceable Assembly (62 percent) less than four times.

The Transmit Major Function was used more frequently than the other binders. This function was referred to less than four times by 30 percent of the respondents, 7 to 9 times by 20 percent, and more than 15 times by 23 percent.

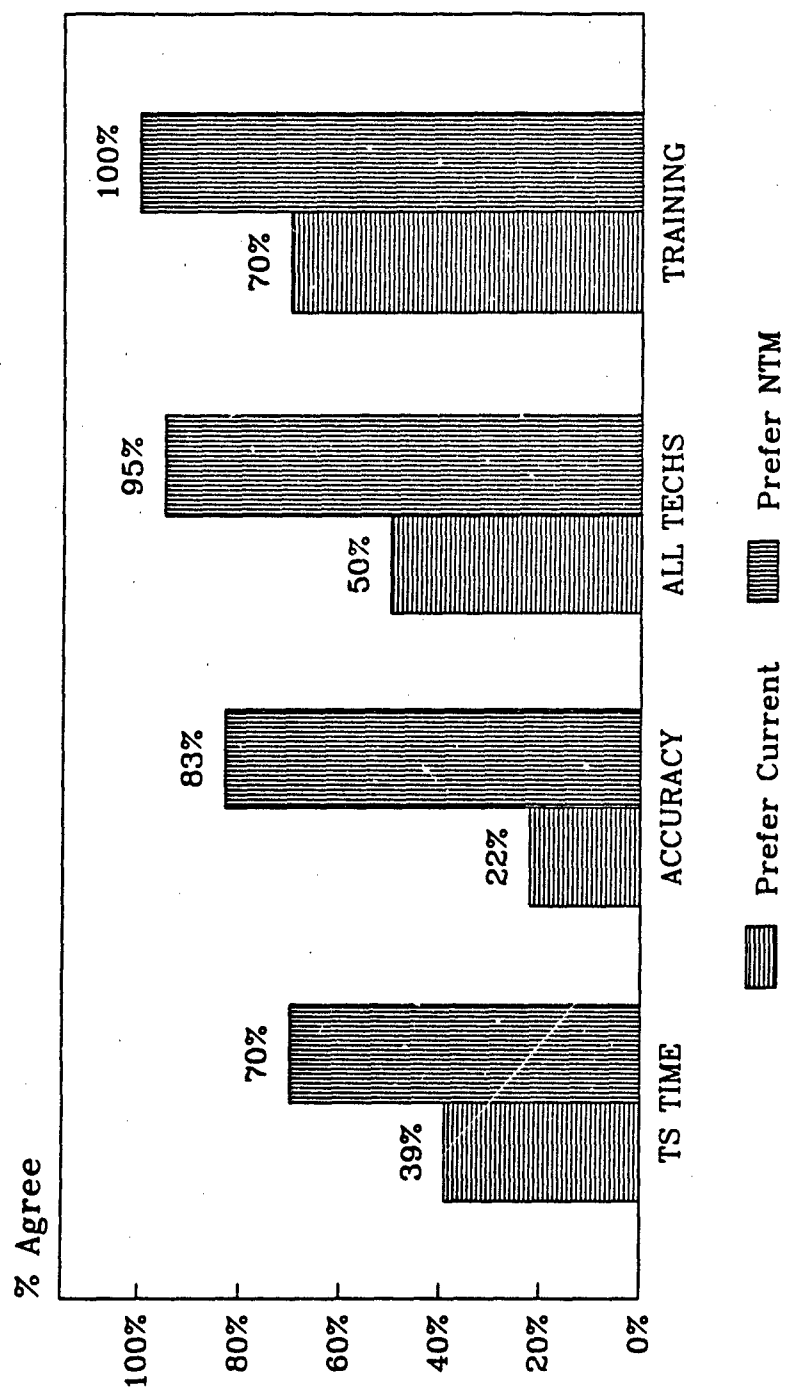


Figure 2. Manual preference and evaluation of NDTM.

A correlational analysis was used to find if the evaluation of NDTM was related to the number of times the participants had referred to the NDTM. The results show the evaluation of the benefits of the NDTM is a function of the frequency of using the NDTM (table 5). For example, the correlation between use of the Transmit Major Function binder and evaluation of the NDTM as useful for shipboard training is -0.28 , $p < .01$. The more frequently this binder was used, the greater it was evaluated as useful for shipboard training. The negative correlation is generated from the reversed wording of the questionnaire items.

Table 5. Correlation between use of binder and perceived benefit^a.

	Number of Times NDTM Referred to		
	Functional Overview	Transmit Major Function	Ship Replaceable Assembly
Evaluation of NDTM			
Trouble-shooting time will decrease	-0.21 *	-0.19 *	-0.17
Accuracy will increase	-0.16	-0.19 *	-0.35 **
Useful for shipboard training	-0.27 **	-0.28 **	-0.30 **

a The negative (-) correlation derives from the scales of the items used in the analyses: item 5 (number of times) correlated with items 6, 7, and 10.

* r -0.19 to -0.21, $p < .05$.

** $r > -0.21$, $p < .01$.

The significance of the correlational results in table 5 are shown as follows. As reported, 30 percent of the respondents reported referring to the Transmit Major Function binder less than four times. Within this group, 50 percent indicate they

prefer the NDTM for maintenance information and 50 percent indicate they prefer the OP. A shift in preference changed dramatically toward the NDTM for the group of participants who referred to the NDTM more than 15 times. In this group, 80 percent of the people indicate they prefer the NDTM over the OP for maintenance information. Figures 3, 4, and 5 provide the results from frequency of use for the three binders. For example, in figure 3, 57 percent of all participants who used the Functional Overview less than four times report that accuracy will increase. Eighty-three percent of all the people who used the Functional Overview more than 15 times expect accuracy to increase.

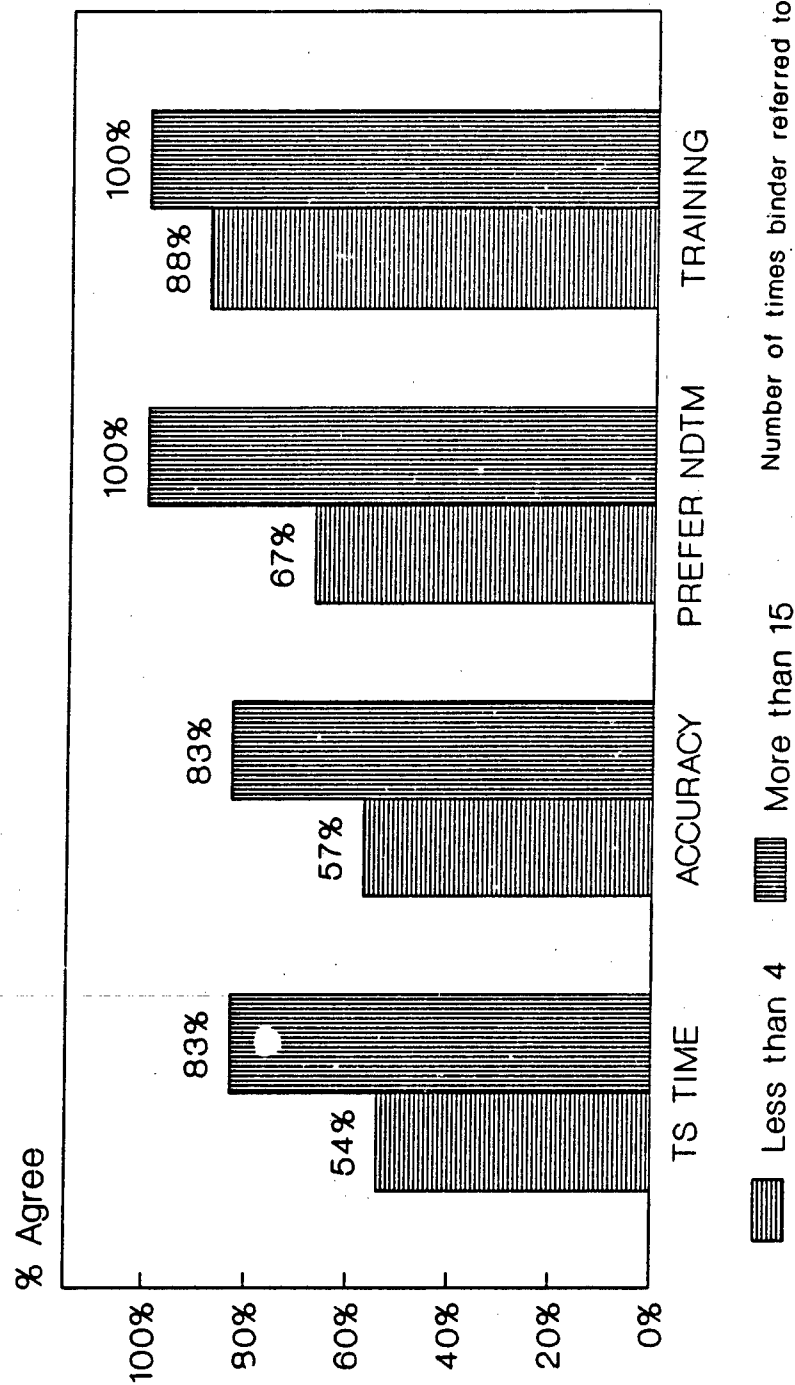


Figure 3. Use of functional overview binder and perceived benefit.

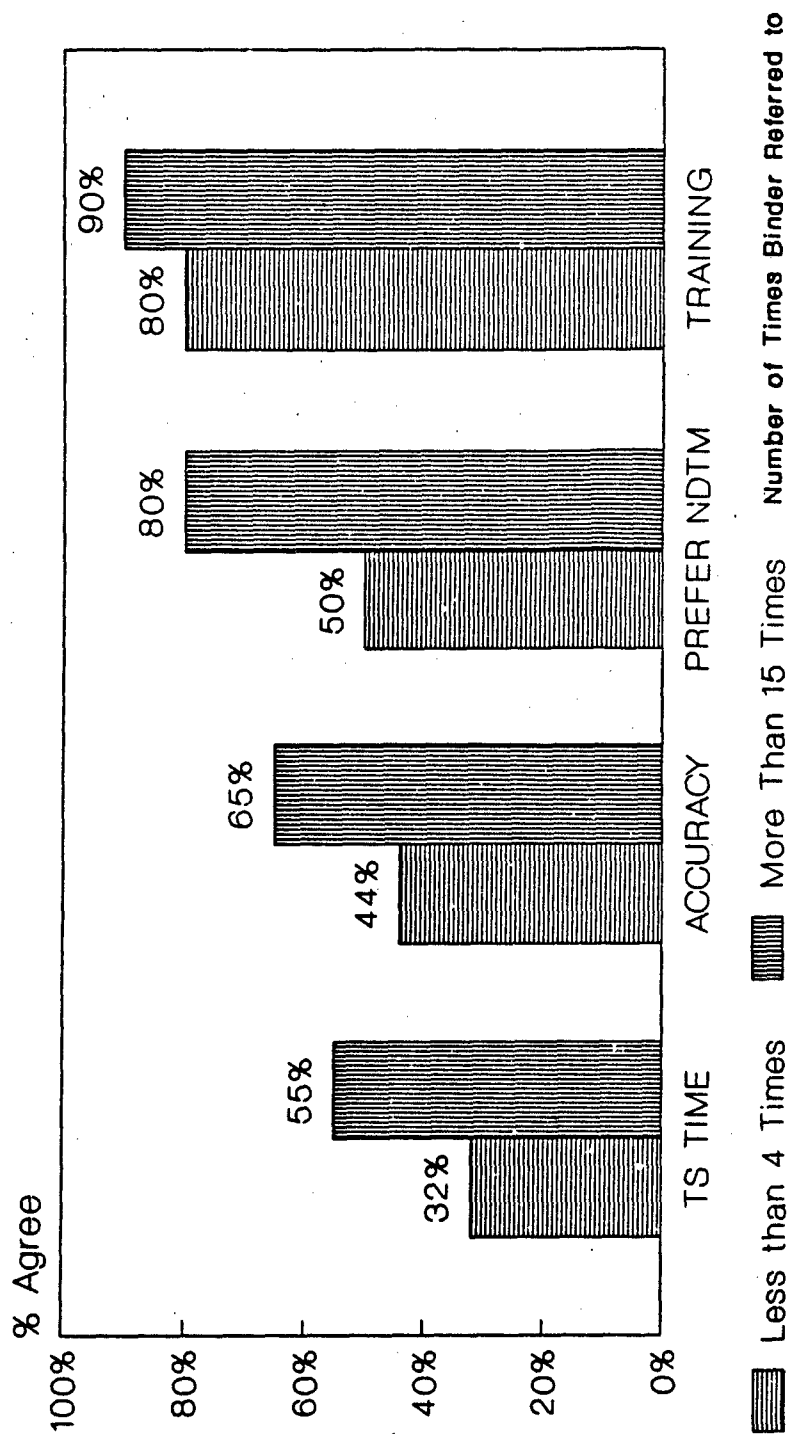


Figure 4: Use of transmit major function binder and perceived benefit.

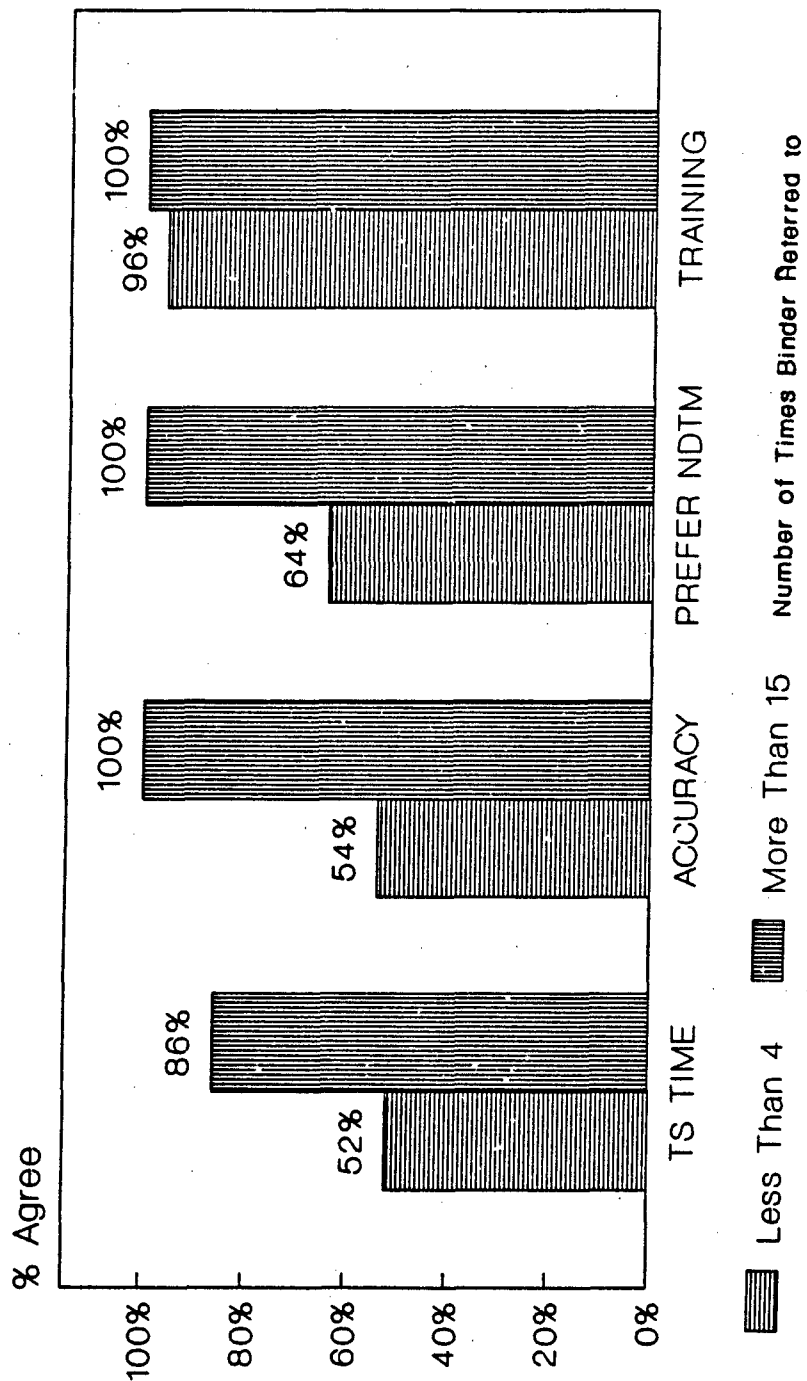


Figure 5. Use of ship replaceable assembly and perceived benefit.

Figure 4 shows only 55 percent of the participants who used the Transmit Major Function more than 15 times expect that troubleshooting time will decrease. This result is much lower than the results on expected troubleshooting time using the other two binders. These results may be due to the large percentage (20 percent) of participants who expected no change in troubleshooting time with use of the NDTM Transmit Major Function binder. This same pattern was shown for accuracy where 65 percent of the people in the higher use category (more than 15 times) expect use of the NDTM Transmit Major Function binder to result in greater accuracy. No change in expected accuracy was reported by 35 percent of the participants.

The results were the same for people in the Pacific and Atlantic Fleets. On all the criteria shown in figures 3, 4, and 5 there were no practical differences between the evaluations by these Fleets. There was a maximum of a 5 percent difference.

USE OF MEDIA AND PERCEIVED BENEFITS OF NDTM

There were differences in perceived benefits of the NDTM between people who indicated the introduction media were useful and those who had not used the media. Figures 6, 7, and 8 show the results of this analysis. The greatest differences were for the booklet that consisted of definitions and examples of the NDTM features (figure 7). For example, for the people who indicated the booklet was useful, these same people indicated that the use of the NDTM would result in less troubleshooting time (86 percent). In contrast, 42 percent of the people who did not use the booklet reported use of the NDTM would result in less troubleshooting time.

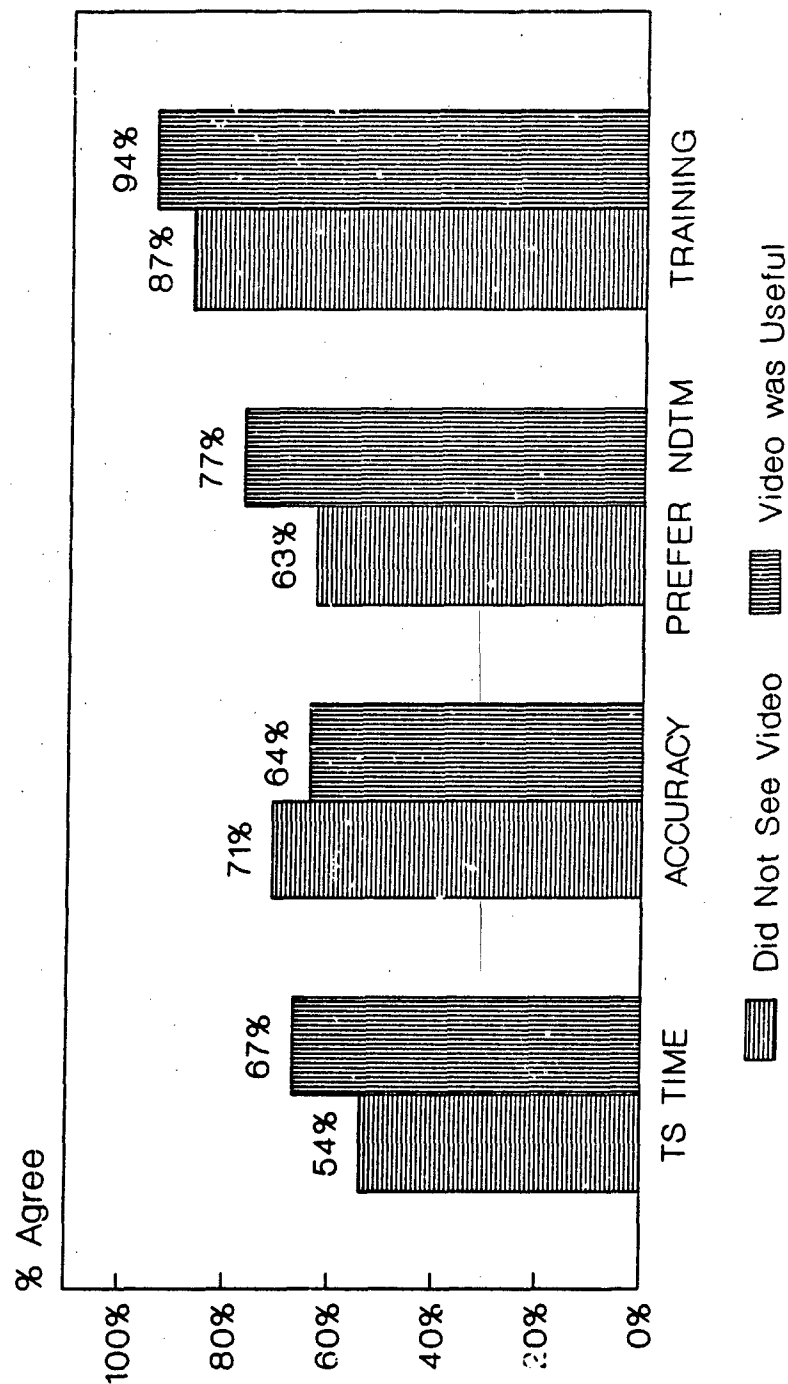


Figure 6. Use of video and perceived benefits of NDTM.

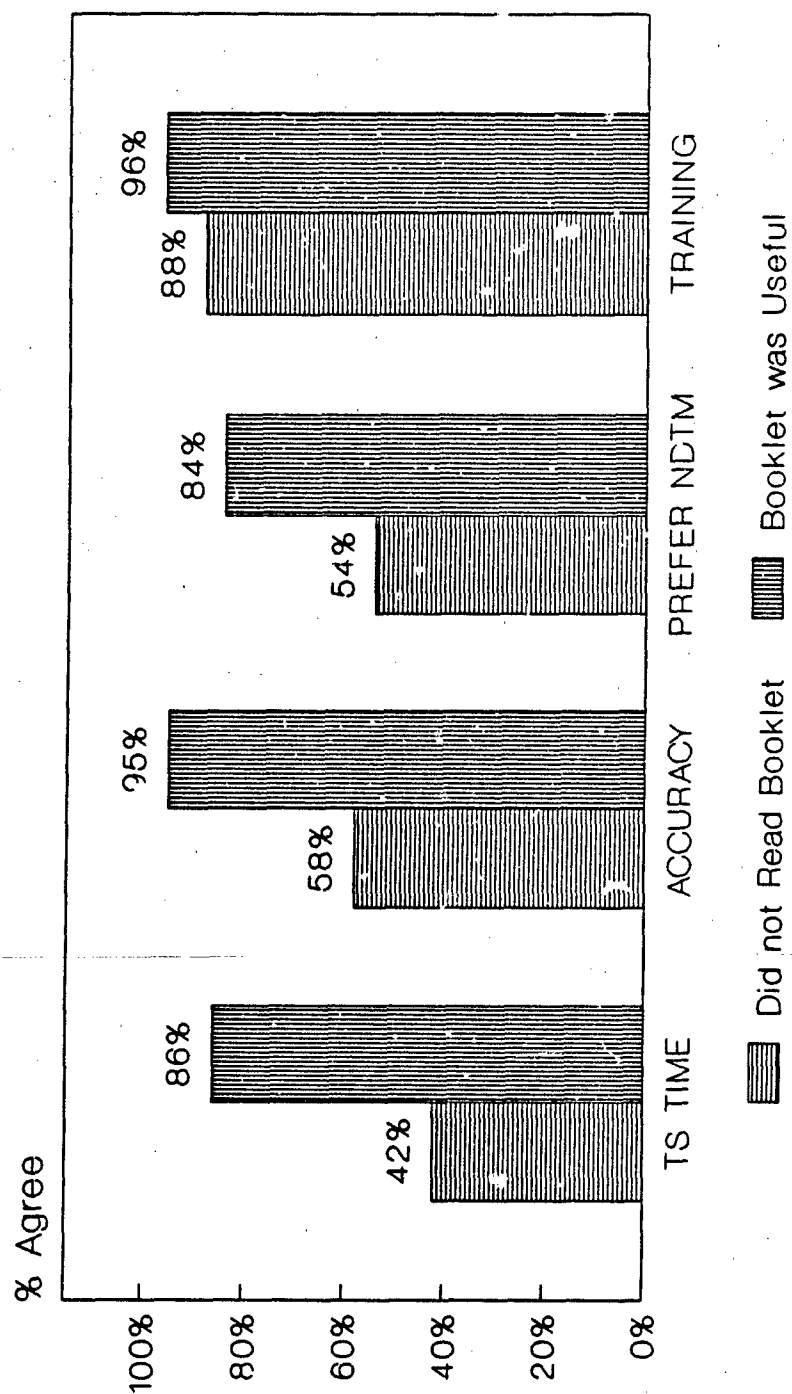


Figure 7. Use of booklet and perceived benefits of NDTM.

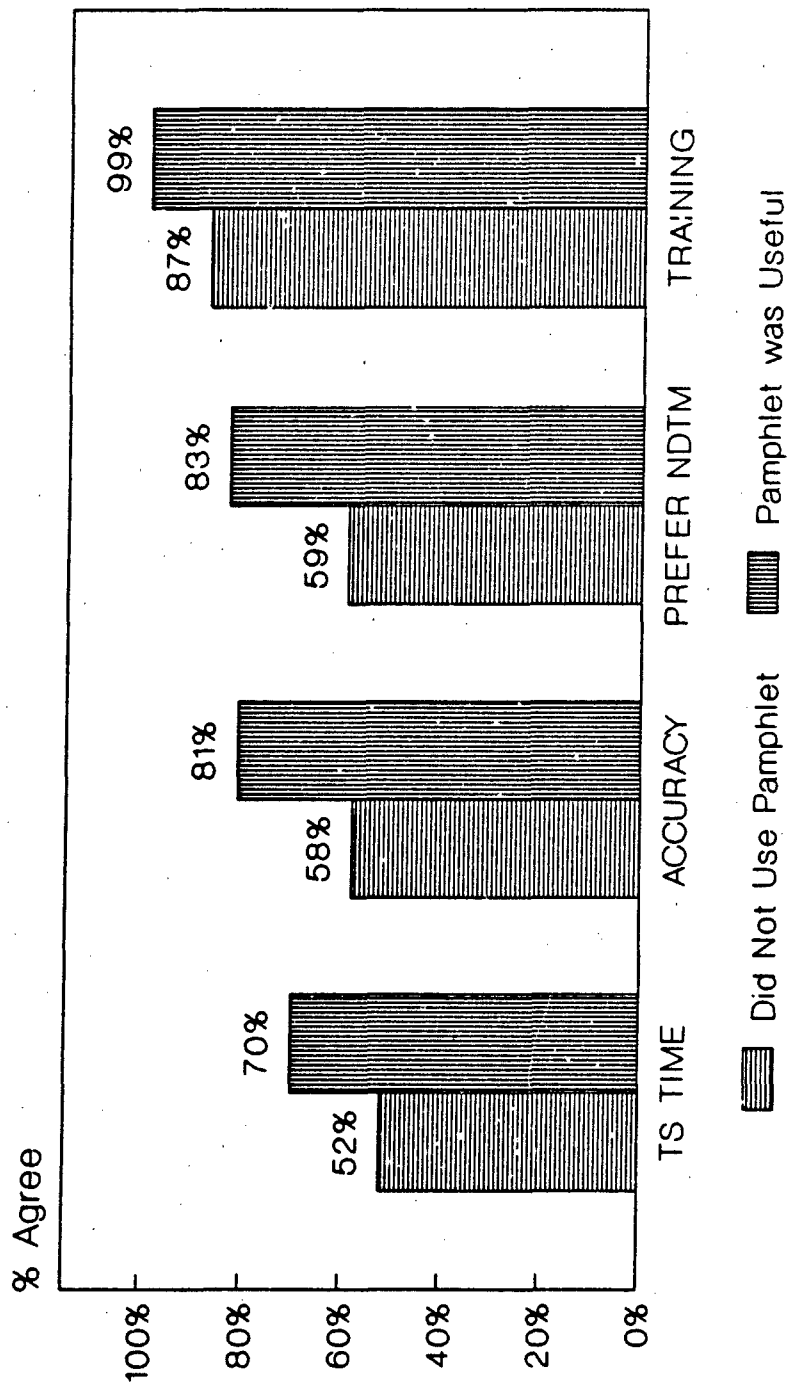


Figure 8. Use of pamphlet and perceived benefits of NDTM.

PARTICIPANT COMMENTS

Participants submitted 27 comments shown in appendix C. A reading of the NDTM comments shows that most of the comments are either recommendations or problems with the NDTM. While some of the problems are not shared by others, there may be a few problems that need attention. Specifically, comments from participants 64 and 81. There is also a request from two participants for the inclusion of the transmitter schematics.

The two comments about the schematics are in contrast to the results from the report on the survey used to capture Fleet questions after reviewing a sample of the NDTM (Sander, 1988). The report stated that many of the CV(N) NATO technicians were not pleased with the exclusion of the schematics in the NDTM.

DISCUSSION

The success of a change can be attributed to the adequacy of the problem identified, the utility of the change, and the probability of implementing the change. These three objectives have been accomplished. Smillie and Curran (1983) identified the specific problems in the OP using human factors criteria and input from the Fleet. The NDTM is viewed by the Fleet as an acceptable alternative to the OP. And the NDTM was successfully introduced.

The unique characteristics of the NDTM necessitated an effort to facilitate Fleet orientation to the NDTM, an effort that would prompt implementation of the NDTM by the Fleet. An educational approach was taken through the development of media that the technicians used to learn about the NDTM. This was an effort in managing attention as well as providing a standardized diffusion of information (Van De Ven, 1986; Zaltman and Lin, 1971). The results from this strategy showed that the technicians who indicated the media were useful (video, booklet, and pamphlet), perceived greater benefits from use of the NDTM than others who did not use the media. Additionally,

NAVSEACENPAC/LANT provided a trusting link for emulating the transfer from the use of the OP to the NDTM.

The introduction effort accomplished critical goals that are essential to implementing change (Radnor, Rubenstein, and Tansik, 1970). The media raised an awareness of the benefits to be gained from use of the NDTM and facilitated an understanding of the NDTM. The Fleet was involved in the evolution of the NDTM through participation in usability testing and reviewing a sample of the NDTM. Most important was the support for the change from the NATO SEASPARROW Project Office. This support was evident in time allotted for developing the introduction effort and the people made available for support.

The orientation process (workshop) may have been instrumental in generating an interest in and subsequent use of NDTM. Results show that more frequent use of NDTM was associated with greater perceived benefits. Previous research, by Zajonc (1968), has also shown this relationship.

The significance of the results is seen when other data are brought to light. Before NDTM was introduced into the Fleet, a sample of the NDTM was mailed to all NATO SEASPARROW workcenters. A questionnaire followed that included a question on position toward the NDTM. Of the 135 responses, 29 percent reported they were not sure if they wanted to change from using the current manual to the use of the NDTM and 11 percent reported they preferred the OP. Also, 435 questions were submitted (Sander, 1988). These questions were in three areas: general questions about NDTM; organization and use; and technical. The question and answer pamphlet contained the answers to these questions.

The introduction effort was responsive to the Fleets' need for information about the NDTM. Providing the question and answer pamphlet, booklet, and video may have been instrumental in allaying doubts about transferring from use of the OP to use of the NDTM.

The correlational results showed that those who used and benefited from the NDTM introduction media had a positive evaluation of the NDTM. This may mean that the knowledge

evaluation of the NDTM. This may mean that the knowledge transfer concept was applicable. Given an acceptable new technology, people who are informed about the benefits of this technology are likely to elect to use it.

CONCLUSIONS

The NDTM is being positively received by the Fleet. The expended effort in developing the NDTM introduction media was worthwhile as these materials were useful to the Fleet.

The survey process provided an opportunity for the Fleet to submit the results from their review and use of NDTM. Results show that more frequent use of NDTM resulted in a more positive evaluation of NDTM. This positive relationship supports a coordinated introduction effort that facilitates immediate use of new technology so the Fleet can work towards a point where they can make a knowledgeable evaluation.

The NDTM introduction was a proactive effort on the part of the NATO SEASPARROW Project Office. They recognized that the NDTM was a significant change from the OP (current technical manual), and therefore would require a coordinated and planned effort to transition the Fleet to use the NDTM. The goal was to minimize resistance to the change. This goal was achieved by developing the introduction media and workshops.

RESULTS FROM THE SEAT SECTION OF THE QUESTIONNAIRE

SEAT PHASE II SOFTWARE INTRODUCTION

The SEAT Phase II tapes were introduced, for the most part, by the NAVSEACEN representatives (57 percent). In addition, introductions were provided by work center supervisors (14 percent), and by some of the technicians (13 percent). These results reflect introduction efforts in both the Pacific and Atlantic Fleets. There were some differences in perceived usefulness of the SEAT introduction. While 88 percent of the Atlantic fleet reported that the introduction was useful, 73 percent of the Pacific fleet did so.

USE OF SEAT PHASE II SOFTWARE

The participants indicated how often they had used the five SEAT Phase II tapes before completing the questionnaire. The most frequently used tapes were the Operational Program and Off-Line Maintenance. The Operational Program and Off-Line Maintenance tapes were used more than 15 times by 82 percent and 66 percent, respectively, of the participants. The Seat Diagnostics tape was used less than four times by 33 percent of the participants and more than 15 times by 33 percent of the participants. The System Training and Data Playback tapes were used less frequently. Most of the participants indicated they used these tapes less than four times.

EVALUATION OF THE SEAT SOFTWARE

Each of the five SEAT Phase II tapes was evaluated on ease of use, adequacy of information, and expected change in performance from using a tape. Table 6 shows all software was evaluated as easy to use. Differences were found between the tapes for adequacy of information. The System Training and Data Playback tapes were evaluated as containing all or most of the

information needed by 69 percent and 71 percent, respectively, of the participants. For the System Training tape, 20 percent reported that only some of the information was provided in the tape. These relatively low ratings are in contrast to the higher ratings shown for the other three SEAT Phase II tapes.

The participants view the use of all tapes as decreasing their work time. The decrease in work time ratings is low in comparison to the ratings in the other two categories.

Table 6. Evaluation of the SEAT Phase II tapes.

Tape	Easy to Use (%) a	Adequate Information (%)	Decrease in Work Time (%)
System Training	82	69	63
Operational Program	88	94	65
Off-Line Maintenance	88	88	63
Data Playback	80	71	59
SEAT Diagnostics	89	83	70

a % = the percent of the total number of responses.

EVALUATION OF THE 15 SEAT PHASE II FUNCTIONS

Aside from the time of day function, all of the functions received favorable evaluations by the respondents. Table 7 provides the results.

Table 7. Evaluation of the 15 SEAT Phase II tape functions.

Function	Importance ^a (%)	Accuracy ^b (%)	Usefulness ^c (%)
Time of Day	24	74	29
Off-Line Maintenance	99	95	94
Recorded Data Display	82	90	86
Communication Status	96	94	90
Air Target Training	84	86	81
On-Line Signal Monitor	91	92	94
Data Recording	81	84	79
On-Line Performance Monitor	93	83	87
2D Acquisition Evaluation	85	91	78
3D Acquisition Evaluation	81	90	77
System Display Summary	80	91	80
Missile Firing Report	88	86	81
NSSCOP Inspect and Change	93	94	92
MK157 Diagnostic Printout	83	86	85
Surface Target Training	74	79	73

^a Important or very important.

^b Mostly or completely accurate.

^c Useful or very useful.

PARTICIPANT COMMENTS

Space was provided in the questionnaire for comments on the Seat Phase II Tapes. A total of 73 comments were written. Most of the comments were recommendations for improving elements of SEAT other than those evaluated in this study. All of the comments are provided in appendix D.

DISCUSSION AND CONCLUSIONS

The Fleet is very satisfied with the SEAT Phase II software. The time spent in the Engineering Working Groups and the In-Process Reviews has resulted in software that the Fleet readily accepts. The plethora of recommendations for further changes may be an indication that the Fleet perceives there is an avenue for communicating recommendations that will result in the changes they want.

The results showed that the use of the Phase II software would result in a decrease in work time by a moderate percentage of the participants. This may mean that regardless of improved ease of use and adequacy of information, the technicians are working as efficiently as possible. There may be other constraints in the working environment that the Phase II tapes have not impacted.

RECOMMENDATIONS

Obtain wide community participation in the introduction of new technology. The feedback from the participants will serve to ensure that the attributes of the product have been maximized.

Use a proactive orientation for the introduction of new technology. Included in this orientation are planning for anticipated contingencies and communication with all participants in the process.

The survey process should be considered for future evaluation projects as it provides both the development and user communities with an avenue for sharing information.

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Appendix A

THE INTRODUCTION OF THE NEW DEVELOPMENT TECHNICAL MANUAL:

Design and Material

This appendix includes material used in the concept and introduction of the New Development Technical Manual (NDTM). Included are the model that guided the introduction effort and the NAVSEACENPAC booklet used for instruction on the elements of the effort. The NAVSEACENLANT booklet was the same. Following are some comments about these materials.

MODEL

The model shows the use of the media at the 'C' Schools and Missile Conferences. Students and Fleet personnel were considered as possible agents for introducing the NDTM to the Fleet. If not, NAVSEACENPAC/LANT were to be used. After the NDTM introduction, the evaluation process began, concluding with feedback from the NSSMS Project Office on the outcome of the NDTM introduction to the NSSMS 'C' Schools, conferences, and Fleet.

The NDTM was not delivered to the schools or made available at missile conferences prior to delivery to the Fleet. Thus, the introduction, as shown in the report, was mostly done by NAVSEACENPAC/LANT.

NSSMS, NEW DEVELOPMENT TECHNICAL MANUAL, FLEET INTRODUCTION BY NAVSEACENPAC

This package was provided to the NAVSEACEN people at a workshop. The purpose of the workshop was for training in the introduction procedure and the media.

Included in the package was information on the results of the usability testing, the media, the fleet introduction workshop, and record keeping.

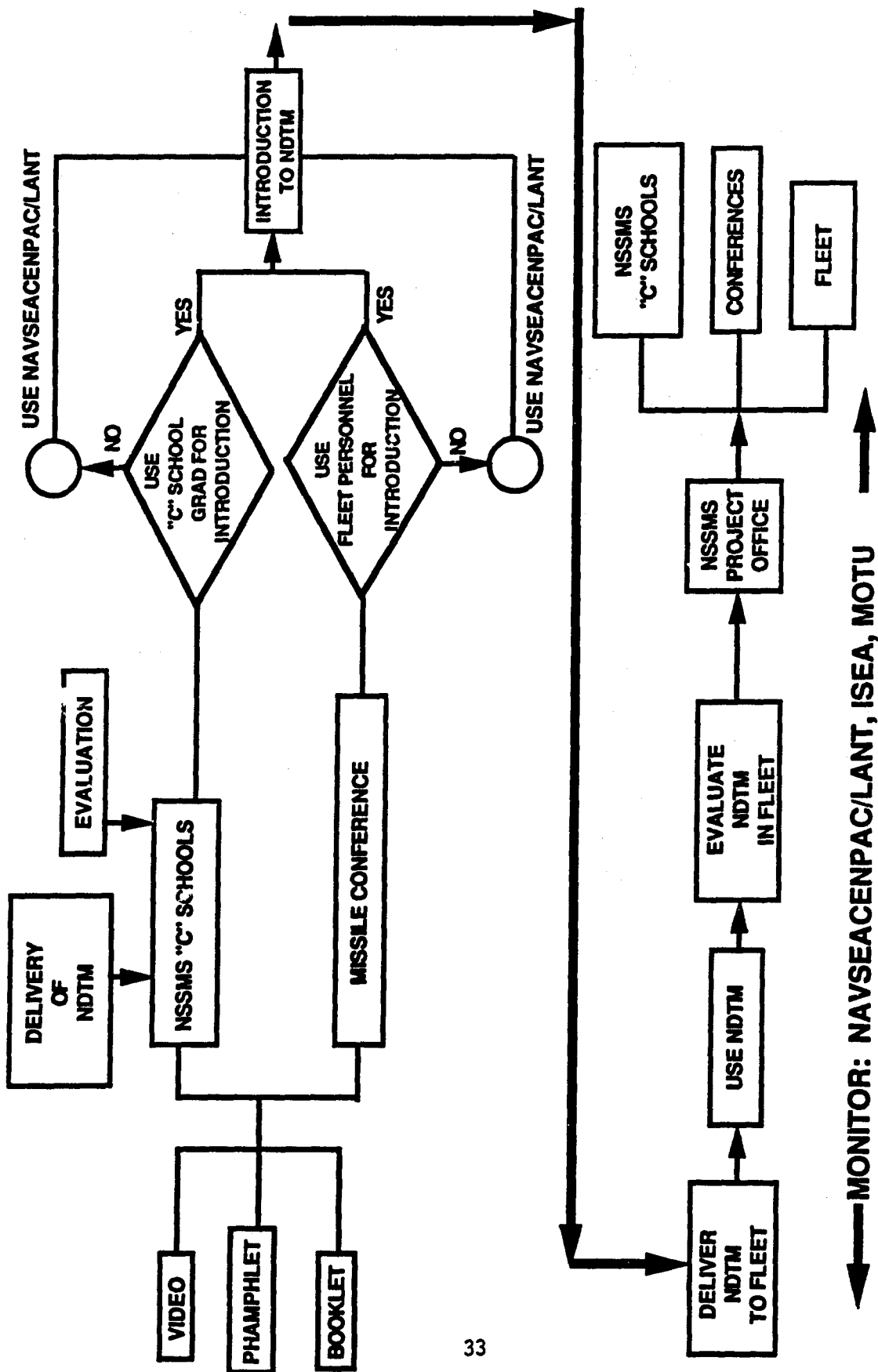


Figure 1. Introduction, delivery, and evaluation of the New Development Technical Manual (NDTM)

NSSMS

NEW DEVELOPMENT TECHNICAL MANUAL

FLEET INTRODUCTION

by

NAVSEACENPAC

September 1989

NEW DEVELOPMENT TECHNICAL MANUAL

The technical manual used for maintaining the NSSMS will soon be replaced by the New Development Technical Manual (NDTM). NAVSEACENPAC/LANT will play a key role in this transition by personally introducing the NDTM to the fleet. Introductions will be accomplished through workshops to be held at a shore based location or aboard ship. The goal is to introduce the NDTM to the fleet as soon as possible.

The enclosed information is intended to provide background information on the NDTM materials and procedures to be used in the introduction of the NDTM to the fleet. The purpose of the materials is to minimize uncertainty about the use of the NDTM as a replacement for the technical manual.

The objective of a personalized introduction is to promote immediate use of the NDTM by the fleet. The alternative of mailing the NDTM would likely result in delayed or non-use of the NDTM. The fleet will benefit from a concerted effort on the part of NAVSEACENPAC to involve the technicians as much as possible in learning about the NDTM.

Included in this package is background information on the NDTM; results of the NDTM usability test; description of the NDTM introduction materials; agenda for the NDTM workshop; and workshop attendance form.

POC for the NDTM fleet introduction is Steve Sander: NOSC, Code 443, San Diego, CA, 92152-5000. Autovon 553-8006, (619) 553-8006.

NEW DEVELOPMENT TECHNICAL MANUAL (NDTM)

The NDTM represents a functional orientation of the NSSMS. The technical information is organized by major function with all the troubleshooting information for each of eight functions contained in their respective binders. As the cost of developing the entire NDTM was prohibitive, the NATO Seasparrow Project Office (NSPO) decided to acquire NDTM incrementally. The original intent was for NDTM to completely supercede the existing 44 binders for both 7H and 7M. As the 7H systems are being phased out, NSPO directed that any effort on the 7H version be stopped. NDTM will cover the entire NSSMS instead of the current System (SW261-T2), two Subsystems (SW261-Q2 & SW394-F1), and three Unit manuals (ST890-MO, SW264-D2, & SW265-F2) approach in the existing TMs.

The first increment of the NDTM will consist of three binders. The three binders are System Functional Overview (SFO) binder (SW261-TM-MMO-011, 012), Transmit Major Function binder (-050), and the Transmitter Ship Replaceable Assembly Identification binder (-110). The first increment is built on a JUN 1986 baseline as the contract was let in OCT 1986. A separate change page package supporting the Block 1R ORDALT will be issued to sites receiving the ORDALT which will enable the introduction of NDTM to all 7M users with or without Block 1R installed.

The three binders of NDTM will be used in conjunction with the existing TM set with exception of the Transmitter FOID binder. This one FOID binder will be superceded by the new Transmit Major Function binder. Additionally, the existing Transmitter Power Distribution, Transmitter Schematics, and the Transmitter Parts Lists will be purged from SW261-Q2-MMO-000. The SFO third level (SFO III) diagrams have been developed for each of the 43 subfunctions in NSSMS. These diagrams will reference either the Transmit Major Function binder for troubleshooting the Transmit Function or the troubleshooting material (FOIDs, Connection Diagrams, etc.) in the existing TM set. The SFO III diagrams use as a method of accessing the troubleshooting material in the existing TMs has been validated as a useful tool in troubleshooting.

The NDTM utilizes a work package concept in that all of the material for troubleshooting a failed SRA is contained in a single binder. There will be no need to use more than one binder to isolate to an SRA and find parts ordering information (p/N and FSCM) when NDTM is COMPLETELY developed. The Transmit Major Function binder is the only completely developed work package binder as part of the first increment.

The Detailed Functional Description is packaged with the Detailed Functional Diagrams (Signal Flow type figures) in the Major Function binder, and the General Functional Description is packaged with the three levels of SFO diagrams (Block Diagram overview figures). In the Transmit Major Function binder, there is a set of Additional Aids (19 total, 17 for the Radar Ready and 2 for the Radar Radiate subfunctions) that presently reside in the DCAP binder in the Transmitter Troubleshooting Guide. When other major function binders are developed, there will be Additional Aids to assist in troubleshooting difficult faults in many of the other subfunctions.

USABILITY TESTING OF THE NATO SEASPARROW NEW DEVELOPMENT TECHNICAL MANUAL:
MARE ISLAND AND DAM NECK

Resistance to major change is the usual rule for anything new. Acceptance of the NDTM by technicians, however, was overwhelming, the majority actively preferring it to the current manual. Virtually every feature and characteristic of the NDTM elicited favorable comment. Especially liked was the structure that permitted all information needed to troubleshoot a malfunction to be found in one volume. Signal flow could be more easily tracked than in the current multivolume manual. The numbering system, once it was mastered, made it easy to access whatever narrative or schematic information was desired. Locator Diagrams included on schematics provided specific detail so that a part or test point could be easily found.

The majority of the few negative comments were actually suggestions for further improvement of the manual. Foremost among these were comments regarding the difficulty in learning how the new numbering system worked and the need for a clearer introduction to the structure and mechanics of the manual.

Concern was expressed that the NDTM would be implemented in increments as functional sections are completed. This would affect training, having to teach and learn both current and new troubleshooting approaches, with a periodically changing mix of the two. It would also make it necessary to use and maintain two partially complete sets of maintenance documents aboard ship. Virtually all the technician participants were anxious for the complete NDTM to be implemented as soon as possible.

Even with only limited familiarity and experience with the NDTM, technicians could use the new manual easily and effectively to diagnose system faults. Although the NDTM required them to adapt to a functional-oriented rather than equipment-oriented approach to their tasks, they demonstrated little difficulty in making the transition and repeatedly expressed a preference for the functional approach.

Introductory instruction for the NDTM will be necessary. The orientation, structure, features and use of the manual can readily be taught in Class "C" schools. Previously trained technicians already aboard ship will not have the benefit of such training in the NDTM. Lack of clear, easily comprehended instruction in the NDTM for shipboard personnel could negate the manual's acceptability and use by them.

NDTM INTRODUCTION MATERIALS

Video

The purpose of the video is to provide the NSSMS community with a standardized orientation to the NDTM. The video provides the rationale, attributes, and benefits of the NDTM. It is not for training.

The video will be shown at each workshop and a copy of the video will be given to each ship's workcenter.

Question and Answer Pamphlet

A sample of the NDTM was sent to the fleet for review and comment. This pamphlet contains answers to the fleet questions as well as a brief description of the NDTM. The pamphlet is a means for ensuring that everyone is informed about the NDTM. Each workcenter can have as many copies of the Pamphlet as they want.

Booklet

The booklet contains topics on the features of the NDTM and sample troubleshooting problems. Most of the workshop will center on the information in this booklet. Technicians will be ready to use the NDTM when they have learned this information. Provide each workcenter with as many copies as they want.

Messages

A message will be sent from the NATO SEASPARROW Project Office to NSSMS ships. The message will announce the introduction of the NDTM to the fleet by NAVSEACENPAC. The message will include a brief description of the workshop, invitees, and a rationale for attending. This message will be referenced when NAVSEACENPAC sends a message to each ship to announce a workshop.

WORKSHOP

Each NSSMS ship will be introduced to the NDTM at a workshop. A workshop will be conducted at a shore based location or aboard ship. The shore based workshop will likely be used when personnel from more than one ship are available for an introduction. It is suggested that one person from NAVSEACENPAC conduct an introduction for no more than eight people. THE SCHEDULING OF WORKSHOPS WILL BE A NAVSEACENPAC RESPONSIBILITY.

The recommended agenda for the workshop is shown below.

Welcome to the New Development Technical Manual workshop. The purpose of this workshop is to provide you with an orientation to the NDTM as well as some experience in troubleshooting with the NDTM. When you have completed this workshop you will be prepared to use the NDTM at your first opportunity.

- o Provide the background on the change to the NDTM as well as results from the usability testing.

- o Briefly review the use of the NDTM introduction materials:

Video

Question and Answer pamphlet

Booklet of NDTM topics and sample troubleshooting problems

- o Show the video

- o Go through the Booklet

Each NSSMS workcenter represented at a workshop will receive the NDTM, TMIN INTEGRATION, AND, IF APPLICABLE, A BLOCK 1R CHANGE PACKAGE.

Keep a log of questions and concerns expressed at each workshop. This information will be sent to Steve Sander and shared with NAVSEACENLANT.

Inform the technicians that they will receive a NDTM evaluation questionnaire in approximately six weeks and are encouraged to return it.

Ensure that a NSSMS Workcenter Information Form is completed for each workcenter that is introduced to the NDTM. Send these forms to Steve Sander.

How will technicians who cannot attend a workshop be introduced to the NDTM?

The NDTM introduction will become the responsibility of those who attended the workshop. It is important to convey to these technicians that the same materials and procedures should be used for the workshop that they will present. It is possible that the technicians could attend a future workshop.

NDTM Introduction Workshop

NSSMS Workcenter Information Form

The information that you provide on this form will be used to keep track of ships that have been introduced to the NDTM. Please use one form for each workcenter.

SHIP: _____

Number of NSSMS workcenters: _____

Home port: _____

The following people attended the NDTM introduction workshop:

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

How many technicians are assigned to this workcenter? _____

The workshop was held: aboard ship _____ shore based _____

Date of the workshop: _____

APPENDIX B

**NEW DEVELOPMENT TECHNICAL MANUAL (NDTM) AND SEAT PHASE II
QUESTIONNAIRE**

NEW DEVELOPMENT TECHNICAL MANUAL (NDTM) AND SEAT PHASE II QUESTIONNAIRE

Recently your ship received the NDTM and SEAT Phase II tapes. The NATO SEASPARROW Project Office is interested in receiving your opinions and comments on how well these materials are working for you.

If you have not used the NDTM or SEAT Phase II tapes, please take time to familiarize yourself with these materials before responding to the questionnaire items on the following pages.

Please respond to all of the questionnaire items and write any comments you may have. Return the completed questionnaire to your NSSMS work center supervisor within 7 days. He will return all questionnaires to the Naval Ocean Systems Center.

Your participation is greatly appreciated. The results from the survey will be published in a future NATO SEASPARROW newsletter. If you have any questions, please contact Dr. Steve Sander at the Naval Ocean Systems Center, Code 443, San Diego, CA 92152-5000: AUTOVON 553-8006; Commercial (619) 553-8006.

PRIVACY ACT STATEMENT

Your participation is voluntary. The responses you provide will be combined with those from the other NATO SEASPARROW technicians. Your ship will not be identified in the results of this survey.

NEW DEVELOPMENT TECHNICAL MANUAL (NDTM)

Background

Rate: _____

Ship: _____

'C' School graduation date: _____

When did you first start using the NDTM: _____

When did you first start using the SEAT Phase II tapes: _____

For the first item, circle the number of any options that apply.

1. The NDTM was introduced to me by:

1	2	3	4	5	6
NAVSEACEN Representative	'C' School Instructor	Work Center Supervisor	NSSMS Co-worker	Myself (I learned how to use NDTM on my own)	Never introduced to me

A video tape, Introduction Booklet, and Question and Answer Pamphlet were available for the introduction of the NDTM. For items 2, 3, and 4, circle the number of the option that best describes how useful these materials were for you.

2. Video	<p>1 <u>Very useful</u> Provided an overview of the NDTM features and showed how it was an improvement over the current OP.</p>	<p>2 <u>Somewhat useful</u> Provided some information about the NDTM.</p>	<p>3 <u>Not useful</u> The video was not useful for introducing the NDTM to me.</p>	<p>4 <u>Cannot Evaluate</u> I have not seen the videotape.</p>
3. Introduction Booklet	<p>1 <u>Very useful</u> Provided many useful descriptions and examples on how to use the features of the NDTM.</p>	<p>2 <u>Somewhat useful</u> Provided some useful descriptions and examples on how to use the features of the NDTM.</p>	<p>3 <u>Not useful</u> The Booklet was not useful for introducing the NDTM to me.</p>	<p>4 <u>Cannot Evaluate</u> I have not read the booklet.</p>
4. Question and Answer Pamphlet	<p>1 <u>Very useful</u> Provided many helpful answers to general and technical questions about the NDTM.</p>	<p>2 <u>Somewhat useful</u> Provided some helpful answers to general and technical questions about the NDTM.</p>	<p>3 <u>Not useful</u> The Question and Answer Pamphlet was not useful for introducing the NDTM to me.</p>	<p>4 <u>Cannot Evaluate</u> I have not read the pamphlet.</p>

For items 5(a) through 5(d), circle one option that reflects your experience with the NDTM.

5. Since the NDTM was introduced to you, how many times have you referred to the following binders?

(a) Functional Overview SW261-TM-MMO-011	Less than 4	4-6	7-9	10-12	13-15	More than 15
(b) Functional Overview SW261-TM-MMO-012	Less than 4	4-6	7-9	10-12	13-15	More than 15
(c) Transmit Major Function SW261-TM-MMO-050	Less than 4	4-6	7-9	10-12	13-15	More than 15
(d) Ship Replaceable Assembly Identification SW261-TM-MMO-110	Less than 4	4-6	7-9	10-12	13-15	More than 15

6. Troubleshooting time when using the NDTM, in comparison to the current OP, will:

1 Decrease greatly	2 Decrease somewhat	3 Remain the same	4 Increase somewhat	5 Increase greatly
--------------------------	---------------------------	-------------------------	---------------------------	--------------------------

7. The accuracy of my work when using NDTM, in comparison to using the current OP, will:

1 Decrease greatly	2 Decrease somewhat	3 Remain the same	4 Increase somewhat	5 Increase greatly
--------------------------	---------------------------	-------------------------	---------------------------	--------------------------

8. As a source of maintenance information for the NSSMS transmit function , I prefer to use:

1 New Development Technical Manual	2 Current OP
--	-----------------

9. NDTM is beneficial to:

1 All technicians	2 New technicians only	3 Experienced technicians only	4 Not beneficial to new or experienced technicians
----------------------	------------------------------	---	--

10. For shipboard training, NDTM is:

1 Very useful	2 Somewhat useful	3 Borderline	4 Of little use	5 Of no use
------------------	----------------------	-----------------	--------------------	----------------

11. Some of the features in the NDTM are listed below for your evaluation. Indicate your opinion of each feature by assigning a number from each of the three evaluation categories.

EVALUATION CATEGORIES

FEATURE	<u>Importance</u>		<u>Accuracy</u>		<u>Usefulness</u>	
	Very important	1	Completely accurate	1	Very useful	1
	Important	2	Mostly accurate	2	Useful	2
	Borderline	3	Borderline	3	Borderline	3
	Not important	4	Mostly inaccurate	4	Of some use	4
	Very unimportant	5	Completely inaccurate	5	Of no use	5

System Functional Overview	MMO-011				
Numbering System					
System Functional Overview (SFO) Level 1					
System Functional Overview (SFO) Level 2					
System Functional Overview (SFO) Level 3					
Operational Flow Diagram (OFD) and Operational Sequence Diagram (OSD)					

System Functional Overview	MMO-012	Importance	Accuracy	Usefulness
System Level Fault Resolution Matrices				
System Performance Monitor Fault Index				
System Level Indication Fault Directory				
Daily System Operability Test (DSOT) and Radar Operability Test (ROT) Sequence Diagrams				

Transmit Major Function	MMO-050	Importance	Accuracy	Usefulness
Transmitter Indicator Diagram				
Degraded Faults and No Go Faults Tables				
Subfunction Troubleshooting Flow Charts				
Subfunction Signal Flow Diagrams (SSFD)				
Detailed Functional Diagrams (DFD)				
Additional Aids				

Ship Replaceable Assembly	MMO-110	Importance	Accuracy	Usefulness
Reference Designation-to-Part Number Index				
Illustrated Parts Diagrams				
Part Number-to-Reference Designation Index				

12. What changes would you recommend to improve the NDTM? (Use the backside of this page as needed).

SEAT PHASE II

For the items below, circle one option that reflects your experience with the SEAT tapes.

1. Since the Phase II tapes were delivered to your ship, how many times have you used each tape?

System Training	Less than 4	4-6	7-9	10-12	13-15	More than 15
Operational Program	Less than 4	4-6	7-9	10-12	13-15	More than 15
Off-Line Maintenance	Less than 4	4-6	7-9	10-12	13-15	More than 15
Data Playback	Less than 4	4-6	7-9	10-12	13-15	More than 15
Seat Diagnostics	Less than 4	4-6	7-9	10-12	13-15	More than 15

2. The System Training tape is:

1 Very easy to use	2 Fairly easy to use	3 Borderline	4 Fairly difficult to use	5 Very difficult to use
--------------------------	-------------------------------	-----------------	------------------------------------	----------------------------------

3. How much information does the System Training tape provide you?

1 All that I need	2 Most of what I need	3 Some of what I need	4 A little of what I need	5 None of what I need
-------------------------	--------------------------------	--------------------------------	------------------------------------	--------------------------------

4. Compared to the old tape, the time to complete my work with the new System Training tape will:

1 Decrease greatly	2 Decrease somewhat	3 Remain the same	4 Increase somewhat	5 Increase greatly
--------------------------	---------------------------	-------------------------	---------------------------	--------------------------

5. The Operational Program tape is:

1 Very easy to use	2 Fairly easy to use	3 Borderline	4 Fairly difficult to use	5 Very difficult to use
--------------------------	----------------------------	-----------------	------------------------------------	----------------------------------

6. How much information does the Operational Program tape provide you?

1 All that I need	2 Most of what I need	3 Some of what I need	4 A little of what I need	5 None of what I need
-------------------------	--------------------------------	--------------------------------	------------------------------------	--------------------------------

Compared to the old tape, the time to complete my work with the new Operational Program tape will:

- | | | | | |
|------------------|-------------------|-----------------|-------------------|------------------|
| 1 | 2 | 3 | 4 | 5 |
| Decrease greatly | Decrease somewhat | Remain the same | Increase somewhat | Increase greatly |

The Off-Line Maintenance tape is:

- | | | | | |
|------------------|--------------------|------------|-------------------------|-----------------------|
| 1 | 2 | 3 | 4 | 5 |
| Very easy to use | Fairly easy to use | Borderline | Fairly difficult to use | Very difficult to use |

How much information does the Off-Line Maintenance tape provide you?

- | | | | | |
|-----------------|---------------------|---------------------|-------------------------|---------------------|
| 1 | 2 | 3 | 4 | 5 |
| All that I need | Most of what I need | Some of what I need | A little of what I need | None of what I need |

Compared to the old tape, the time to complete my work with the new Off-Line Maintenance tape will:

- | | | | | |
|------------------|-------------------|-----------------|-------------------|------------------|
| 1 | 2 | 3 | 4 | 5 |
| Decrease greatly | Decrease somewhat | Remain the same | Increase somewhat | Increase greatly |

The Data Playback tape is:

- | | | | | |
|------------------|--------------------|------------|-------------------------|-----------------------|
| 1 | 2 | 3 | 4 | 5 |
| Very easy to use | Fairly easy to use | Borderline | Fairly difficult to use | Very difficult to use |

How much information does the Data Playback tape provide for you?

- | | | | | |
|-----------------|---------------------|---------------------|-------------------------|---------------------|
| 1 | 2 | 3 | 4 | 5 |
| All that I need | Most of what I need | Some of what I need | A little of what I need | None of what I need |

Compared to the old tape, the time to complete my work with the new Data Playback tape will:

- | | | | | |
|------------------|-------------------|-----------------|-------------------|------------------|
| 1 | 2 | 3 | 4 | 5 |
| Decrease greatly | Decrease somewhat | Remain the same | Increase somewhat | Increase greatly |

14. The Seat Diagnostics tape is:

1	2	3	4	5
Very easy to use	Fairly easy to use	Borderline	Fairly difficult to use	Very difficult to use

15. How much information does the Seat Diagnostics tape provide you?

1	2	3	4	5
All that I need	Most of what I need	Some of what I need	A little of what I need	None of what I need

16. Compared with the old tape, the time to complete my work with the new Seat Diagnostics tape will:

1	2	3	4	5
Decrease greatly	Decrease somewhat	Remain the same	Increase somewhat	Increase greatly

17. The functions of the SEAT Phase II tapes are listed here for your evaluation. Indicate your opinion of each function by assigning a number from each of the three evaluation categories.

EVALUATION CATEGORIES

<u>Importance</u>		<u>Accuracy</u>		<u>Usefulness</u>	
Very important	1	Completely accurate	1	Very useful	1
Important	2	Mostly accurate	2	Useful	2
Borderline	3	Borderline	3	Borderline	3
Not important	4	Mostly inaccurate	4	Of some use	4
Very unimportant	5	Completely inaccurate	5	Of no use	5

1. Time of Day			
2. Off-Line Maintenance			
3. Recorded Data Display			
4. Communication Status			
5. Air Target Training			
6. On-Line Signal Monitor			
7. Data Recording			
8. On-Line Performance Monitor			
9. 2D Acquisition Evaluation			
10. 3D Acquisition Evaluation			
11. System Display Summary			
12. Missile Firing Report			
13. NSSCOP Inspect and Change			
14. MK157 Diagnostic Printout			
15. Surface Target Training			

- | Less than
4 | 4-6 | 7-9 | 10-12 | 13-15 | More than
15 |
|----------------|-----|-----|-------|-------|-----------------|
|----------------|-----|-----|-------|-------|-----------------|

- | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------------------------|--------------------------|---------------------------|--------------------|---|------------------------------|
| NAVSEACEN
Representative | 'C' School
Instructor | Work Center
Supervisor | NSSMS
Co-worker | Myself
(I learned
how to use
the tapes
on my own) | Never
introduced
to me |

- | 1 | 2 | 3 | 4 | 5 |
|----------------|--------------------|------------|------------------|--------------|
| Very
useful | Somewhat
useful | Borderline | Of little
use | Of no
use |

- | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|---------|------------|-----------|--------|-------|------------|
| Always | Usually | Frequently | Sometimes | Seldom | Never | No opinion |

- [illegible]

-
-
-
-
-

APPENDIX C

**SURVEY RESULTS OF NEW DEVELOPMENT TECHNICAL MANUAL (NDTM) AND
SEAT PHASE II QUESTIONNAIRE:**

Comments about the NDTM and SEAT Phase II Software

**SURVEY RESULTS OF NEW DEVELOPMENT TECHNICAL MANUAL
(NDTM) AND SEAT PHASE II QUESTIONNAIRE:**

*(*See note below)*

QUESTION #12 -- COMMENTS ABOUT THE NDTM:

- #2:** a. Training tape does not work.
 b. Make all the pubs available now.
- #7:** Front of every NDTM should have a sheet for description of number locating, or number referencing, i.e. to find reference/figure number remember that first number represents _____ and second number means _____, or a reminder to that affect.
- #8:** Use in conjunction with existing pubs. For me, existing pubs seem to be more detailed, however NDTM takes you through quicker.
- #9:** Used with old pubs.
- #19:** Include all tables and information from SW261-Q2-MMO-080/OP4005, as is not enough about SDP. Cassette loading troubleshooting needs to be added.
- #21:** Try to make the whole system into this.
- #24:** Have SRA book (MMO-110) list more detailed information for the entire system; not just for the transmitter.
- #25:** I want my schematics diagrams returned; also parts breakdown.
- #33:** Use more of the reference diagrams from the old pubs.
- #42:** More function description on program itself.
- #45:** Highlight high fail areas as per DCAP/FBR inputs from the Fleet/shore commands. Identify nonstocked parts for open purchase purposes. Plastic cover shields, EMI gaskets/rubber gaskets on door assembly, etc.

Note: the number (e.g. #2) is the questionnaire from which the comments originate .

#46: Items #9 - 2D Acquisition Evaluation and #10 - 3D Acquisition Evaluation:

Need better ref. to pubs and circuits involved for repair and troubleshooting.

Item #14 - MK157 Diagnostic Printout:

No documentation to support the test or the evaluation of the results for system troubleshooting and repair.

Snapshot is useless and is not supported for troubleshooting or system status by pubs!

#47: *I believe a complete change over of all pubs would be more effective as opposed to the partial turnover.*

#48: *I would not recommend any changes to the NDTM, I would however, run another questionnaire after the Fleet has utilized them for a longer period of time.*

#53: *NDTM is easy to use but in some cases, when they refer you to the current OP the figure has already been deleted.*

#54: *I would suggest the inclusion of the schematic diagrams from the XMTR (old) pubs that have been eliminated. These are the ones for individual circuit cards.*

#55: *Include more detailed functional diagrams to further breakdown transmit functions.*

#56: *Make up schematics for block IR or ORDALT items.*

#58: *Some minor errors with numbering and small mistakes of this kind. Outstanding in all other respects and highly advantageous to technicians.*

#63: *Rewrite entire pub system so I can understand them.*

#64: *Found the ARC reference fault circuits very difficult to follow (actually is a red major fault, yet pub indicates yellow). Only really new circuit in BLK IR so a better writeup would be useful for troubleshooting the fault circuit itself.*

#77: *Stick to major function pubs except in the schools. The MFP's are most used.*

#80: *I would like to see a section that covers each control and indicator, especially consoles, that describes specific uses and reasons the system would automatically use that function or indication. Do not necessarily need specific signal flow.*

#81: *The transmit major function pub has made my job much easier. Although some of the voltage readings in the DFD are inaccurate and should be reevaluated. Those values may reflect manufacturer spec's but do not reflect actual values in a live seasparrow environment. Most of the waveforms that I had to compare were accurate.*

#84: *I would get rid of the whole set. The diagrams are confusing and can lead into dead ends. There's nobody I've talked to who has liked them and this is probably the general feeling in the Fleet. This should not be forced on the techs like you're determined to do.*

#86: *I have no recommendations for changes. My view of these pubs is limited because I learned the system with the old pubs and am yet to become comfortable and proficient with the new ones.*

#87: *The only change I can recommend is to make construction of pubs more durable. We have used them so much that they are already tearing up vice the old ops which have been used 10 times as much over the years and are still in good shape. We really like the way everything is combined and right there in one pub. Extremely easy to use once you get past the "old dog can't learn new tricks" attitude. We have found no mistakes as yet and find the additional aids section a great help.*

QUESTION #17:

#52: *Item 1 - Time of day - Accuracy:*

Time of day does not update while in menu.

QUESTION #22 -- COMMENTS ABOUT THE SEAT PHASE II SOFTWARE:

- #5:** *Missile check simulated UT checks.*
- #6:** *A better condition on 4821 M-4R thru M-9R, and make them easier.*
- #7:** *Still under use for full capabilities.*
- #11:** *An EAT for all cabinets that are tied in with the computer instead of just RSC and FOC.*
- #13:** *More T/S abilities from SEAT for all pieces of equipment.*
- #14:** *OP memory/auto recovery like on MK157 comp.*
- #15:** *Auto recovery for memory; hardwired OP prog.*
- #19:** *I would like to see the SEAT upgrade so that it will replace the worthless MK157.*
- #23:** *Basically very accurate in commonly used areas. OLM is great*
- #24:** *LCHR troubleshooting tapes.*
- #26:** *Would like to see some way of making a hard copy of the SEAT display. Also, clearer instructions on the 2D, 3D Acq. program.*
- #29:** *Built-in system diagnostic testing.*
- #30:** *Would like to see the OP program for computer included in SEAT.*
- #33:** *More training options.*
- #34:** *More help with Fleet introduction.*
- #35:** *Troubleshoot system; especially XMITTER.*
- #38:** *Most problems that I have encountered are with the lack of knowledge on usage of the tapes. More time needs to be e*

mphasized on the proper usage and functions of these tapes in school. They can be very beneficial to a technician.

- #40:** *Giving the option to run RAPID test on the OLM tape instead of having to go through RAPID just to do another test. I still use the old maintenance tape if I'm in a hurry to run another test.*
- #41:** *I would like to see more training for us on the tapes and new pubs. They (Reps) only gave us 4 pubs).*
- #42:** *Detailed description of particular function.*
- #44:** *Possible SDC cards that are faulted printed on screen.*
- #45:** *Incorporate a SEAT keyboard to unlock all SEAT programming and troubleshooting capabilities.*
- #46:** *A full-size keyboard for opening the complete abilities of the SEAT for programming and troubleshooting. A 3 1/2 disk drive to replace the RCRs used in the NSSMS system to increase data storage, reliability, and increase parts availability to component level through Naval Supply System and civilian retail/wholesale outlets. It would also reduce the amount of tapes and reduce storage area.*
- #47:** *Full keyboard to enhance troubleshooting techniques.*
- #49:** *ECM on SEAT training scenario.*
- #54:** *The ability to load off-line without having to run RAPID. I realize that there is a way to bypass RAPID, but having to page through assorted menus to get to needed screens.*
- #55:** *More detail in troubleshooting SEAT.*
- #56:** *Printout capabilities of all screens. More detailed maintenance documentation on operation of the SEAT.*
- #58:** *A more comprehensive introduction and explanation of the capabilities and limitations as well as the use of the software.*
- #59:** *Installation of keyboards.*

- #62:** A way to zero synchros in the launcher and director.
- #64:** More system status information with easier access (examples: Power Out (M.O. and P.A.), SSBG Freqs., SFC Pwr Outputs (current and voltage), RCVR BITE values). With no long explanations of what they should be or how they are used. Long explanations are usually of little use to experienced technicians and should be saved for separate training periods.
- #65:** To be able to completely control the entire system from the SEAT.
- #66:** Fewer tapes.
- #74:** A separate "EAT" tape.
- #75:** More test capabilities.
- #76:** Intergrate the computer OP program on the same tape as the off-line maintenance.
- Air training tape with target launch weapon capabilities.
- #78:** 1.) Tape drives changed to 3 1/2" disk drives.
2.) Different easier-to-use fasteners used to secure equipment drawers when they are closed.
- #79:** Eliminate the rest of the PMS CARD for SEAT and computer. Put the instructions all on the SEAT or as much as possible so you're not looking back and forth at the SEAT and PMS card. And more detailed, longer training scenarios.
- #80:** I would like to see RAPID as a subprogram on the OP tape, along with automatic systems communications test. This would be more useful than on the maintenance tape.
- #81:** I suggest that the data format be changed from tape to floppy disk. This would facilitate less tapes and would also decrease the access time of retrieving and storing data. I would also recommend the reintroduction of some type of printing device in which all data could be printed out. This would encourage people to keep historical data and conduct comparisons during those PMS actions where slight differences may indicate system problems.

#84: For air target training I would like to be able to select the time when a target makes a showing. Also we should be able to use both surface and air training at the same time. We should be able to track a ship and have an A/C target pop up. Also we should be able to select 5 target profiles for a single system.

#86: The operational program in ROM to keep from reloading it after maintenance. Larger RAM for less time reloading different volumes if you need a previous test.

#87: I would like to see the rapid portion be more specific on fault monitoring.

QUESTION #23:

#5: The Phase II tapes are very useful and instead of using 5 tapes for a PMS check it takes 2 or 3 to do them.

#7: Still under use for total capabilities.

#8: Thanks for condensing the amount of tapes and adding the help function.

#11: Overall, the tapes are much easier to use and makes maintenance time less.

#13: Good overall, decreases workload.

#14: Phase II tapes are very "user friendly".

#19: MRCs using SEAT Phase II tapes added danger tags not used with old tapes. Bad idea. Takes too much time for simple checks.

#21: When doing inspect and change you can only type in a certain amount of data then a new screen appears. With the old tape you can type in data for days with no changing of the screen.

#22: OLM is very useful. The efforts put in to ease the Fleet's job is noticeable. Definitely enhances troubleshooting the system.

#23: OLM was again the greatest idea yet!

#24: Greatly improves fault isolation. I use them with great confidence.

#26: *Remove the RAPID program from the maintenance tapes. We have lost a lot of completion time in the workcenter because one card in the SDC is on order.*

#33: *I like them. They work alot better than the old tapes.*

#35: *Which buttons to push.*

#42: *Overall helpful.*

#45: *Snapshot should be made useful to technician via applicable documentation or deleted.*

#46: *Snapshot should not be available on SF program tapes. The information is of no real value to the technician level due to the random sampling during the OP PRG cycle. Since we cannot ref. a PRG cycle printout to determine the true values to be seen in the printout on the screen of register data.*

Director evaluation and troubleshooting using the SEAT can be very useful if the test had references to the pubs with the signals and functions under test. Then director response, alignment, and overall operability could quickly be identified and repaired as necessary.

The SEAT should have a different display incorporated into it. The plasma display is too expensive and its life is too short to justify the high cost in these times of responsible spending.

#47: *Full keyboard to enhance troubleshooting techniques.*

#48: *I went to school with the old tapes, so at this point, I stumble through with the new ones. I'm sure that a few months from now I will be more proficient and much happier with the results the Phase II tapes will provide during all phases of my work.*

#53: *The tapes are easier to use than the others due to the fact that they are user friendly. Makes PMS and troubleshooting faster and easier.*

#54: *I have yet to have the opportunity to accurately run training due*

to fault, but find that the information available is far superior to the old.

- #55:** Time consuming to load operational program in order to run RAPID.
- #64:** Overall excellent package. Easy to use expanded training tape would be great. Including any real world threat profiles where the trainer picks the weapon and then is given options really available for employment.
- #68:** Are much better than old tapes.
- #78:** 1.) Change tapes to 3 1/2" disks to reduce number of broken, damaged and lost tapes. Also to reduce storage area and number of tapes.
- 2.) On inspect and change screen used to change information, it might be more advantageous to give it the ability to contain all the changed information on one screen for those of us who have large lists of adaptation data (10 to 15 line items).
- #79:** The tapes do not last very long; they go bad very quickly.
- #80:** Would it be possible to use higher grade tapes? We have had several tapes go bad in the past. Due to stretching and normal use within a month.
- #81:** Please continue your ongoing efforts to make the programs more "user-friendly".
- #86:** I feel that Phase II is a vast improvement and saves the technician a large amount of time.
- #87:** We would like to have more training on the tapes so we know exactly what we are looking at on some portions. Suggest hands-on training/classes of Phase II tapes. We have (USS Obannon) never been indoctr. on Phase II.

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